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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/077,554

02/15/2002

Chad A. Cobbley

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WHYTE HIRSCHBOECK DUDEK S C
555 EAST WELLS STREET
SUITE 1900
MILWAUKEE, WI 53202

EXAMINER

TRINH, HOA B

ART UNIT

PAPER NUMBER

2814

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

04/27/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/077,554

Applicant(s)

COBBLEY ET AL.

Examiner

Vikki H. Trinh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 16, 17, 19, 21-32, 34-37, 44-76 and 85 is/are pending in the application.
- 4a) Of the above claim(s) 19, 21, 22, 25-27, 29-32, 36, 50-54, 59 and 61 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 16, 17, 23, 24, 28, 34, 35, 37, 44-49, 55-58, 60, 62-76 and 85 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. This application contains claims 19, 21-22, 25-27, 29-32, 36, 50-54, 59, and 61 drawn to an invention nonelected with traverse. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 85 are rejected under 35 U.S.C. 102(e) as being anticipated by Mitchell (6,602,740).

As to claims 1, 85, Mitchell discloses a substrate 110 (fig. 5); and a plurality molded plastic stiffener components 142 (fig. 5, col. 3, lines 50-61; col. 9, lines 29-30) secured to the substrate without attachment with an adhesive element, the stiffener components 142 are inherently to increase rigidity of the substrate 110.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 2-8, 11, 37, 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitchell, as applied to claim 1 above, in view of Lim et al. (6,020,221).

Mitchell discloses the invention substantially as claimed. However, Mitchell does not teach that the substrate is made of material such as polymer, polyamide layer, a bismaleimide triazine (BT) resin, an FR4 laminate, an FR5 laminate, a CEM1 laminate, a CEM3 laminate, and a ceramic metal frame.

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Lim et al. (Lim) teaches a semiconductor device 10 having a chip 12, a substrate 14 and a stiffeners 20, wherein the thermal coefficient (col. 2, lines 64-67) of the substrate and the stiffeners expands equally when heat is applied to both layers. (See fig. 8). The substrate is made of a ceramic, laminate, polymer, polyamide, BT -FR5, and FR-4 materials (col. 5, lines 55-60, col. 1, lines 40-410.)

Mitchell and Lim are in the same field of improving a packaging device for a semiconductor chip.

Therefore, as to claim 2, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Mitchell with various materials, as taught by Lim, so as to provide a coefficient of a thermal expansion similar to that of the stiffeners. (col. 2, lines 62-67).

6. Claims 3-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitchell.

As to claims 3-8, Mitchell discloses the invention substantially as claimed, except that the teaching of Mitchell does not explicitly teach that the substrate has a range of thickness of less than about 35-75 microns or that the stiffener has a thickness range of less than about 50-100 microns. Nonetheless, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the substrate with a specific range, since it is a prima facie obvious to an artisan for optimization and experimentation with a specific range of thickness because applicant has not yet established any criticality for the specific range.

Note that normally, it is to be expected that a change in temperature, or in thickness, or in time, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and

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unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller 105 USPQ233, 255 (CCPA 19553).

7. Claims 9-11, 16-17, 23-24, 28, 34-35, 44-46, 48-49, 55-58, 60, and 62-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitchell, as applied to claim 1, in view of Admitted Prior Art (APA), figures 1-2 and specification (spec.), pages 1-2.

Mitchell discloses a semiconductor device and method having a substrate 110 (fig. 5 or 6) and a molded stiffener 142 (fig. 5 or fig. 6) molded onto and secured to the substrate 110 without attachment with an adhesive element.

However, Mitchell does not disclose that the stiffeners are made of a thermoplastic material.

APA discloses a semiconductor device and method having a substrate or lead frame 6 (fig. 1 and spec., page 1, line 13); and a stiffener 14 molded to the substrate 6 (fig. 1). See attachment. As to claims 9-10, 23-24, 55-58 and 67-74, the molded stiffeners 14 comprise of thermoplastic or thermosetting polymeric material (spec., page 2, line 12). Note that the molded stiffener is heated and cool to cure the material for hardening.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Mitchell with the thermoplastic/thermosetting material for the stiffeners, as taught by APA, so as to provide a cheaper material.

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As to claim 11, APA teaches that the thermal coefficient of the expansion of the molded stiffeners 14 (fig. 1) and the substrate 6 (fig. 1) correspond such that when heating is applied both the stiffeners and the substrate expand roughly the same. See attachment.

As to claims 44-46 and 64-66, 75, APA teaches that the molded stiffeners 14 are transfer molded, injection molded, or spray molded to the substrate with encapsulating material 16 (fig. 1), adhesive material 12, or both type of materials for attaching the stiffeners onto the substrate 6 (fig. 1).

As to claims 16 and 28, APA teaches the stiffeners 14 have one cross member 12 (fig. 1).

As to claim 17, APA teaches the stiffeners are in a form of a grid, lattice, a grille, and a web (fig. 1).

As to claims 48-49 and 76, APA teaches the substrate 6 (fig. 1) has two or more compartments 8 for receiving dies 10 (fig. 1).

As to claim 23, APA teaches the substrate 6 (fig. 1) is in a reel form before the stiffeners 14 are being molded.

As to claims 24, 34, 60, Mitchell teaches the semiconductor device having a substrate 110 (fig. 5) and a stiffeners 142 molded to the first surface of the substrate 110 (fig. 5) and a die 118.

As to claims 35 and 62-63, Mitchell's stiffeners 142 are disposed at the periphery of the substrate 110 (fig. 5).

8. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitchell in view of APA, as applied to claim 44 above, and further in view of Culnane et al. (6,517,662).

Mitchell in view of APA discloses the invention substantially as claimed. However, Mitchell and APA do not explicitly teach that the stiffener is bonded to the substrate by way of heating, cooling, and curing.

Culnane teaches a semiconductor device 1 (fig. 1) having a substrate 4 or substrate 14, a chip 8 (fig. 1), a stiffener 10 or a solder ball 13. The substrate 4 has a thickness from 40-60 microns (col. 3, lines 25-30). Culnane also teaches that the substrate 4 has holes or recesses 9 for the stiffeners 13 to be disposed or molded therein. (See fig. 1). Also the stiffeners 13 or solder balls 13 are different from the stiffeners 13, wherein the first stiffeners are disposed on one side of the substrate 4 and the stiffeners 13 are disposed on the other side of the substrate 4 (fig. 1). Furthermore, the stiffener is bonded to the substrate by way of heating, cooling, and curing (col. 6, lines 34-50).

Mitchell, APA and Culnane are in the same field of improving a packaging device for a semiconductor chip.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Mitchell in view of APA with the step for the stiffener to bond by way of heating, cooling, and curing, as taught by Culnane, so as to construct the substrate (Culnane, col. 6, lines 34-50).

Response to Arguments

9. Applicant's arguments filed 02/13/2007, have been fully considered but they are not persuasive.

Applicants argue that the Mitchell does not teach stiffeners. However, Mitchell does teach stiffeners (see above rejection). Applicants also allege that Mitchell's dam is not a

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stiffener. The examiner notes that a dam or a stiffener in the art has the same functionality and it is understood that the stiffener or dam means essentially the same structure. Applicants further allege that the claims of the present invention do not recite "integrally molded" which is what Mitchell teaches. The examiner acknowledges that the claims at the present do not explicitly state the stiffeners being integrally molded. However, the molded stiffeners of Mitchell can not be excluded because the stiffeners are integrally molded. In fact, applicants' specification, page 10, lines 19-20, also teaches the stiffeners being integrally molded. The examiner merely includes additional limitation in the Office Action to anticipate any future claims' limitation. In short, Mitchell meets all of the limitations as claimed.

Again, applicants make similar arguments with respect to Mitchell in view of Lin and Mitchell with APA, Culuane) which are not persuasive in view of the above responses.

For the fore going reasons, the examiner maintains the rejections.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (571) 272-1705. The office fax number is 703-872-9306.

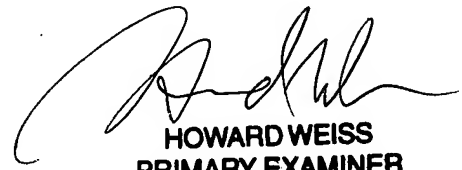
Any request for information regarding to the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspro.gov>. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at

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<http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

Vikki Trinh,
Patent Examiner
AU 2814



HOWARD WEISS
PRIMARY EXAMINER